

Rhode Island Power Sector Transformation Initiatives Presentation

Public Utilities Commission
Technical Session

September 24, 2020

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Rhode Island Electric Transportation

Public Utilities Commission Technical Session

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Agenda

01 ET Scorecard

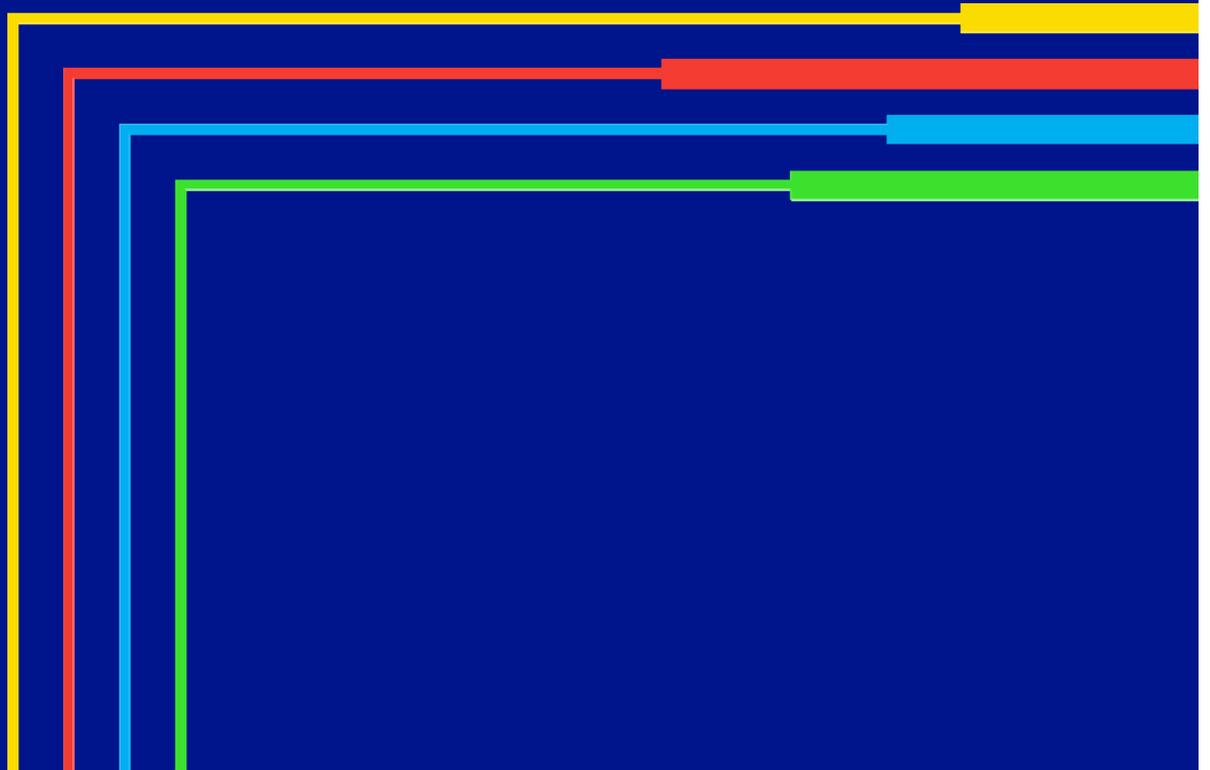
02 ET Initiative RY2 Program Overview

03 Rate Year 4 Overview and Program Goals

01

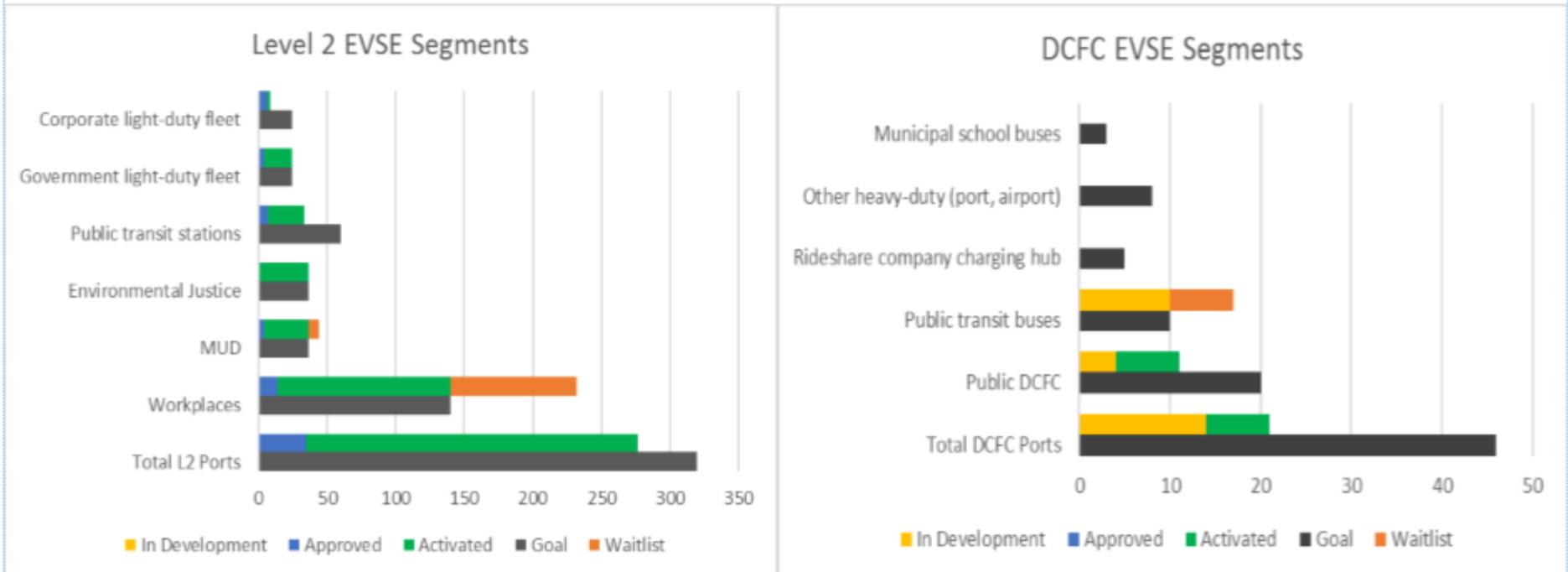
ET Scorecard

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Scorecard: Charging Infrastructure

Charging Infrastructure Program



Scorecard: Charging Infrastructure

Site Overview

In Development Ports

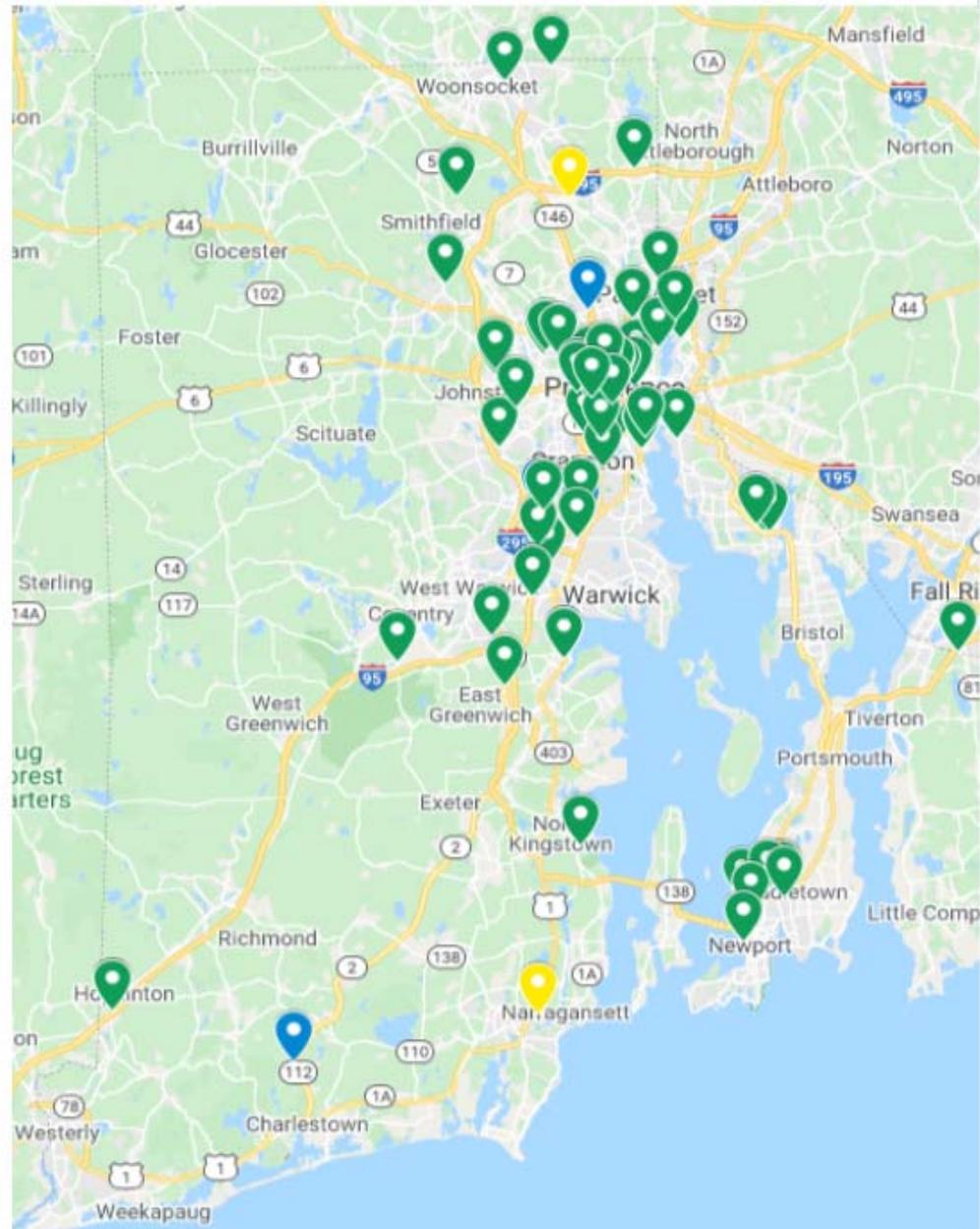
 All items 14 (-15)

Approved Ports

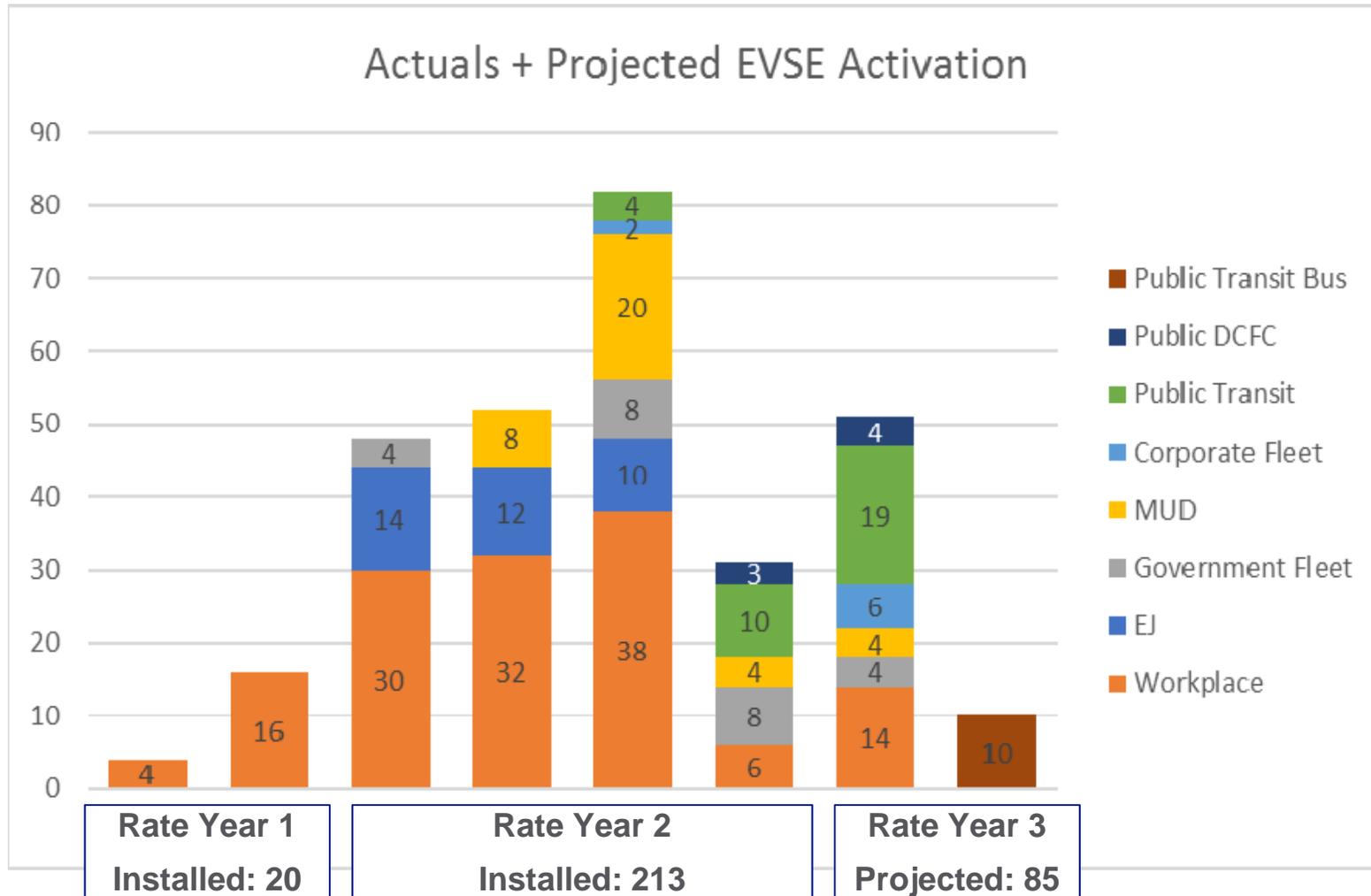
 All items 35 (-19)

Activated Ports

 All items 249 (+26)



Scorecard: EVSE Activation Dates



Scorecard: Fleet Advisory

Participants	9
# Vehicles Evaluated	1933
# Vehicles Recommended for Replacement	135
# Vehicles Planned/Pledged:	13
Total Potential TCO Savings (lifetime)	\$1.2M
Total Potential GHG Savings, <u>lbs</u> CO ₂ (lifetime)	9M <u>lbs</u>

Program Updates —

- Segments include government, public transit, colleges/universities, corporate fleets, school bus transportation vendor
- Average lifetime savings per vehicle assessed: \$8,000.

Scorecard: SmartCharge RI and DCFC Discount Pilot

SmartCharge Rhode Island Program

Month/Year	Average Distance Traveled per Vehicle (mi)	Average Rebate (Treatment Group)
August 2020	772	\$8.50
July 2020	774	\$8.50
June 2020	618	\$7.00
May 2020	518	\$3.50
April 2020	364	\$4.00
March 2020	691	\$5.00
February 2020	900	\$7.00
January 2020	931	\$7.50

Program Updates —

- September 1: Control Group participants transitioned to Treatment Group and notified of off-peak charging incentives

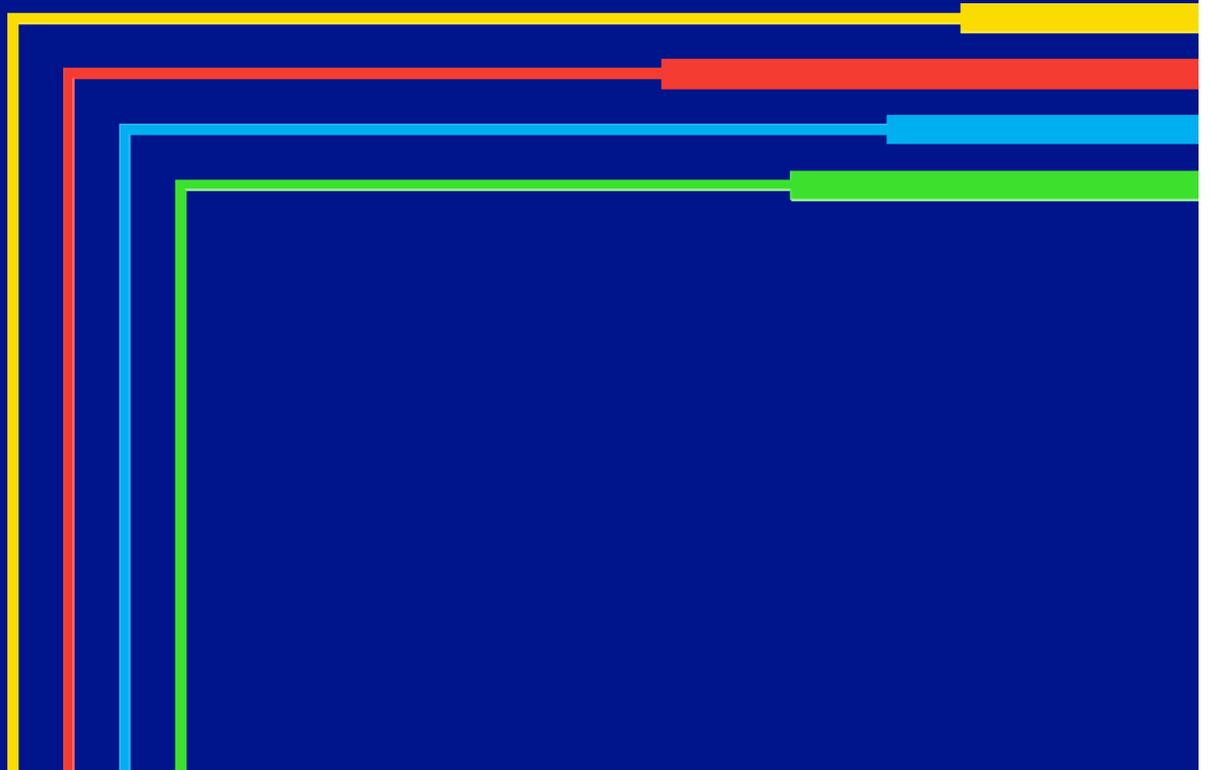
DCFC Discount Pilot

Participation —	
Participants:	1
# Credits Provided:	28
Total Discount Provided:	\$35,107

02

ET Initiative RY2 Program Review

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Warwick Park and Ride



Barrington Town Hall



Warwick Harley Davidson



Hopkinton Park and Ride

Rate Year 2 Overview

- RY2 ET Initiative Summary
 - The Charging Infrastructure Program activated 213 ports in RY2 for a total of 233 ports in RY1-RY2, representing 64% of the overall Program goal and 72% of the Level 2 Program goal. The Company projects another 85 ports in RY3 (87%). In addition, a growing number of projects are “waitlisted.”
 - The Electrify Rhode Island Program supported the Company’s efforts with funding for Level 2 workplace, MUD, and government fleet sectors along with DCFC public access sector.
 - The Off-Peak Program has a full year of on-peak and off-peak charging data and drivers in the Control group were transitioned to the Treatment Group, as planned, for Rate Year 3. The Evaluation vendor in its interim report concluded that price signals had a statistically significant impact (11%) on changing drivers charging behaviors with a final report expected to be included in the Company’s RY2 10/31/2020 filing.
 - The Fleet Advisory Services Program has completed four studies with another five slated to be completed in early RY3. Overall feedback on the program has been positive, with average per-vehicle TCO savings of \$8,000. Participants are contacted post study (e.g. 6 months) to identify barriers, answer questions, and track progress toward fleet electrification.

Rate Year 2 Lessons Learned

1. The Charging Infrastructure Program supports site hosts' investments in charging infrastructure by providing charging stations information, access to vendors and funding for infrastructure and EVSE. Lack of funding and, in some cases, lack of available vehicles has stunted the electrification of certain segments' fleets (e.g. ride share, corporate fleet vehicles).
 - RY2 Proposed Program Modification: None
2. Charging station functionality such as pricing, waitlist/queue, and station availability enabled through networking services benefit EV drivers and site hosts at publicly-accessible charging stations and those located at workplaces and apartment complexes. These benefits are not necessarily realized by EV drivers and site hosts of charging stations powering fleet vehicles.
 - RY2 Proposed Program Modification: Networking services be optional for corporate and government fleet ports or other segments where networking benefits are not providing benefits to EV drivers or site hosts. Site hosts will be required to:
 - Provide mileage records for the fleet EVs
 - Respond to survey questions
 - Allow the Company to monitor charging station usage

Rate Year 2 Progress and Rate Year 3 Projections

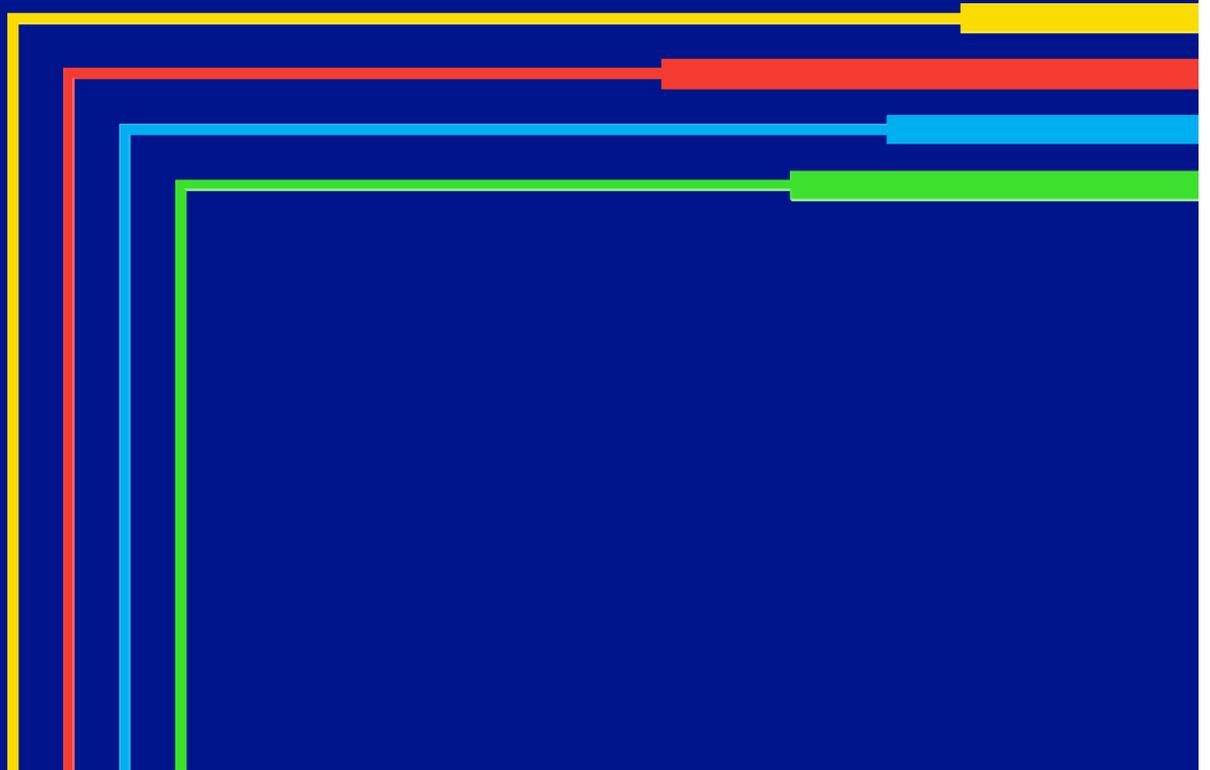
Level 2 Segment	Segment Ports	RY1	RY2	RY3	Notes
Corporate light-duty fleet	24	-	2	12	6 in pipeline
Government light-duty fleet	24	-	20	4	4 to be completed
Public transit stations	60	-	14	29	19 to be completed
Environmental Justice	36	-	36	-	Waitlist
MUD	36	-	32	4	4 to be completed
Workplaces	140	20	106	14	Waitlist
Total L2 Ports	320	20	210	63	

DCFC Segment	Segment Ports	RY1	RY2	RY3	Notes
Municipal school buses	3	-	-	2	
Other heavy-duty (port, airport)	8	-	-	2	2 in pipeline
Rideshare company hub	5	-	-	0	
Public transit buses	10	-	-	10	
Public DCFC	20	-	3	8	4 activated in RY3
Total DCFC Ports	46	-	3	22	

03

RY4 Overview and Program Goals

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RY4 Overview and Program Goals

Total Budget- \$4.9M

RY4 will ensure continuity as a bridge year between end of RY3 (fall 2021) and Phase 2 Filing approval (fall 2022).

1. Charging Infrastructure Program (“Make-Ready” Program)- \$4.275M

- Segment-specific port targets adjusted proportionally

2. Fleet Advisory Program- \$100K

- Continue to target diverse customer types & expand to LMI/EJ communities and Medium/Heavy Duty customers. Aim for up to 3-5 new participants (average cost per participant \$20k).

3. Smart Charge/Residential Off-Peak Program- \$246K

- Continue program, aiming to retain 95% of the participants. Test additional education and marketing to increase rate of off-peak charging and report out statistically significant results.
- Includes Strategic Marketing/Education budget to continue outreach to participants- \$18,750

4. DCFC Discount Program- \$264K

- Continue with offering for new DCFC customers

5. Evaluation- \$30k

- Evaluation efforts will continue allowing for ongoing assessment and incorporation of learnings into programs.

Proposed Targets for EV Charging Infrastructure Program

How RY4 Targets were calculated:

- **RY4 budget is based off the RY3 budget, as outlined in the ASA**
 - Total budget will be \$4.275 mil
 - Includes labor and marketing costs
 - Allocated using the original breakdown (2/3 for L2 and 1/3 for DCFC)

- **Segment budgets and targets were calculated using most up to date cost/port information and our learnings from Y1-2**

- **Included all segments from the ASA**

- **Utilized the RY1-3 ratios for ports per segment (with slight adjustments made to round out budget and # of ports)**

Proposed Targets for EV Charging Infrastructure Program

Segment	RY1-3 Ports Goal	Ports Ratio	RY4 Ports Goal	Ports Ratio	TOTAL
Corporate light-duty fleet	24	8%	20	8%	\$ 195,200
Government light-duty fleet	24	8%	20	8%	\$ 195,200
Public transit stations	60	19%	46	18%	\$ 448,960
Environmental Justice	36	11%	28	11%	\$ 388,696
MUD	36	11%	28	11%	\$ 299,180
Workplaces	140	44%	110	44%	\$ 1,073,600
Total L2 Ports	320		252		\$ 2,600,836

Segment	RY1-3 Ports Goal	Ports Ratio	RY4 Ports Goal	Ports Ratio	TOTAL
Municipal school buses	3	7%	1	6%	\$ 137,150
Other heavy-duty (port, airport)	8	17%	2	12%	\$ 174,300
Rideshare company charging hub	5	11%	2	12%	\$ 149,300
Public transit buses	10	22%	5	29%	\$ 435,750
Public DCFC	20	43%	7	41%	\$ 435,050
Total DCFC Ports	46		17		\$ 1,331,550

RY 4 Totals			269		\$ 3,932,386
RY4 with Labor/Marketing					\$ 4,261,039

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Rhode Island Energy Storage BTM

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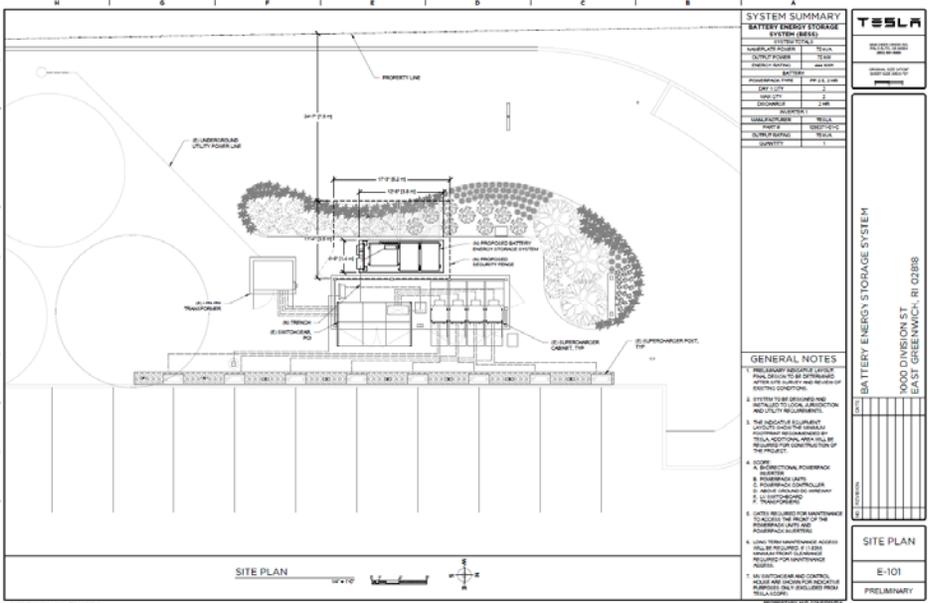
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Energy Storage BTM

PHASE	TASK	START	END
Engineering	Surveying	9/11/2020	1/10/2020
	CD30	9/18/2020	9/18/2020
	CD90	10/6/2020	10/6/2020
	CD100	10/13/2020	10/13/2020
ICx	Application	9/18/2020	10/29/2020
Permitting	Doc Submit	10/15/2020	10/15/2020
	Zoning Hearing	11/24/2020	11/24/2020
	AHJ Review	11/25/2020	12/23/2020
Construction	Civil	1/4/2021	1/18/2021
	Electrical	1/19/2021	1/22/2021
	Landscaping	1/20/2021	1/26/2021
Commissioning	Witness Testing	2/8/2021	2/8/2021
	Permission to Operate	2/22/2021	2/22/2021



Energy Storage FTM

RI Power Sector Transformation Front-of-the-Meter (FTM) ESS

- The FTM energy storage system will consist of up to a **500 kW three hour ESS** for the primary purpose of realizing distribution system value
- Target date for ESS target in-service is February 2022
- **RFP was released** on August 17th, 2020 and the submittal deadline is September 28th, 2020
- National Grid had the **pre-bid call** on August 31st, 2020

PHASE	TASK	TARGET START	TARGET END
RFP	PST/PUC RFP Review	06/29/20	08/17/20
	RFP Release	08/17/20	09/28/20
	RFP Pre-Bid Call	08/31/20	-
	Deadline for Bids	09/28/20	-
	RFP Bid Review	Oct. 2020	Nov. 2020
Contracting	Bidder Selection	-	Nov. 2020
	Execute Contract	Nov. 2020	Jan. 2020
Permitting	Finalize Design	Feb. 2021	Mar. 2021
	Permitting	Jan 2021	Apr. 2021
Construction	Procurement	Feb. 2021	Jul. 2021
	Site Work	May 2021	Jul. 2021
	Electrical Work	May 2021	Jul. 2021
Operation	Interconnection	Feb. 2021	Feb. 2022
	In-Service	-	Feb. 2022
	Testing & Commissioning	-	Aug. 2022

← We are here

Energy Storage Budget & Spend

- The Storage Program is one program under the Amended Settlement, which has two projects: BTM & FTM
- Approximately 20% is either contracted or spent to date
- The projected amount that was moved to RY4 is rationalized through the payment structure presented in the FTM RFP

Budget & Spend (BTM & FTM)					
	RY1	RY2	RY3	RY4	TOTAL
Approved	\$899,375	\$1,365,56	\$41,250	\$0	\$2,306,188
Actual	\$29,225	\$9,157.58 (Actual + Projected)	\$410,603 Contracted BTM	\$510,000	\$2,306,188
			\$1,347,201 Projected FTM		

Rhode Island Grid Modernization Plan

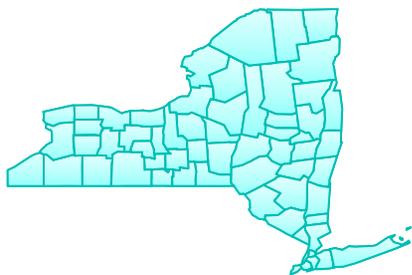
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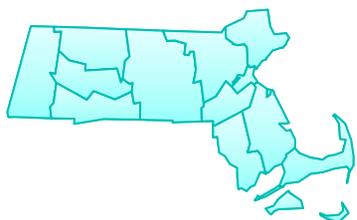


Regulatory Activity and Filing Timeline



New York

- Initial investments in grid mod being progressed based on continued implementation of foundational investments and customer benefits (i.e., Advanced Field Devices, ADMS, GIS, IT Infrastructure, Cybersecurity, Telecoms, VVO/CVR, FLISR)
- Proposed additional grid mod investments in 4-year rate case filed on July 31st 2020
- Anticipate new rates to start in July 2021



Massachusetts

- Initial investments in grid mod being progressed from 2018-2021 (i.e., Advanced Field Devices, ADMS, GIS, IT Infrastructure, Cybersecurity, Telecoms, VVO/CVR, FLISR)
- Total Grid Mod investments: \$82M
- Next filing is in July 2021 for 2022-2024 deployment



Rhode Island

- September 15 PST Subcommittee meeting
- September 24 PUC Technical Session
- October 2020 file Updated AMF Business Case and Grid Modernization Plan (GMP)

GMP is a holistic plan of investments that will enable granular management of the distribution-system

Solution Type	Docket/ Filing	Current Plan			5-Year Plan					10-Year Roadmap				
		FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Customer Enablement	AMF 2020	AMF Business Case			AMF Deployment									
	SRP/Rate Case	System Data Portal (Support Costs)												
Advanced Field Devices	ISR	Feeder Monitoring Sensors, Advanced Capacitors & Regulators (VVO/CVR Pilot)			Feeder Monitoring Sensors									
	ISR	Advanced Capacitors & Regulators (Optimization & Compliance)												
	ISR	Advanced Reclosers & Breakers (Optimization & Compliance)												
Control Center and Back Office	Rate Case	GIS Data Enhancements												
	Rate Case	ADMS Core Functionality					Prot. & Arc Flash App (ADMS)						ADMS Refresh	
	Rate Case	Underlying IT Infrastructure					IT Refresh						IT Refresh	
	Rate Case	Appropriate Cyber Services					Cyber Refresh						Cyber Refresh	
Telecom.	Rate Case	Operational Telecommunications												
Modular Optimizing Applications	ISR/Rate Case	Existing VVO/CVR Platform					VVO/CVR App (ADMS)							
	Rate Case						FLISR App (ADMS)							
	EE/Rate Case						DERMS*							
	Rate Case	ITR Pilot Projects (DERMS, FLISR, etc.)												

* DERMS investment could potentially be delayed under the Low DER Scenario.

Legend: = 2018 Rate Case (ASA) & FY21 ISR Aligned Investments = Additional Investments (e.g., Future Rate Cases, Future ISRs)

Two customer DER adoption scenarios were used to bookend the range of potential future states

- **Low DER = conservative adoption of renewable generation and beneficial electrification based on historic adoption rates**
 - DER adoption assumptions are consistent with the Company’s 2020 long-term D-planning forecast “Low” case
- **High DER = Higher adoption of renewable generation and beneficial electrification consistent with achieving Rhode Island’s 80x50 GHG Goal**
 - DER adoption assumptions are similar to Rhode Island’s EC4 Study and Acadia Center’s 2030 Energy Vision

2030 Future State Scenario Assumptions	Low DER (NECO Low Forecast)	High DER (40x30 GHG Goal)
EVs On-Road, total number	9,000	243,000
EHPs In-Use, total households	<1,000	70,000
Wind DG, MW installed	85 MW	270 MW
T-Connected Renewable, MW installed	N/A	790 MW
Solar DG, MW installed (endogenous for High DER)	950 MW (Avg: 66 MW/year)	1,400 MW (Avg: 108 MW/year)

GMP Business Case Overview

Need:

- Operational: Customer adoption of DER is causing localized distribution system issues today, and these issues are expected to become ubiquitous in 5-10 years
- Customer: Energy savings, outage reduction, DER adoption, renewable DG revenue or credits
- Clean Energy: Resilient Rhode Island Act, Net-zero Carbon Emissions, 100x30 Goal
- Digitization: Granular system data, increased visibility/control (planning, integration, management)

Value:

- BCA developed and refined consistent with the Docket 4600 Framework
- Net customer benefits for Full Grid Mod (RI Only/Opt-Out): \$159 million (Low DER) to \$793 million (High DER)
 - Net customer benefits for Grid Mod Only: \$40 million (Low DER) to \$550 million (High DER)
- BCA Ratios for Full Grid Mod: 1.26 (Low DER) and 2.05 (High DER)
 - BCA Ratios for Grid Mod Only: 1.13 (Low DER) and 2.23 (High DER)

Accountability:

- Semi-annual reporting of GMP implementation and performance metrics
- Future collaboration on GMP-related performance incentive metrics (PIMs)

GMP is not seeking cost recovery for investments

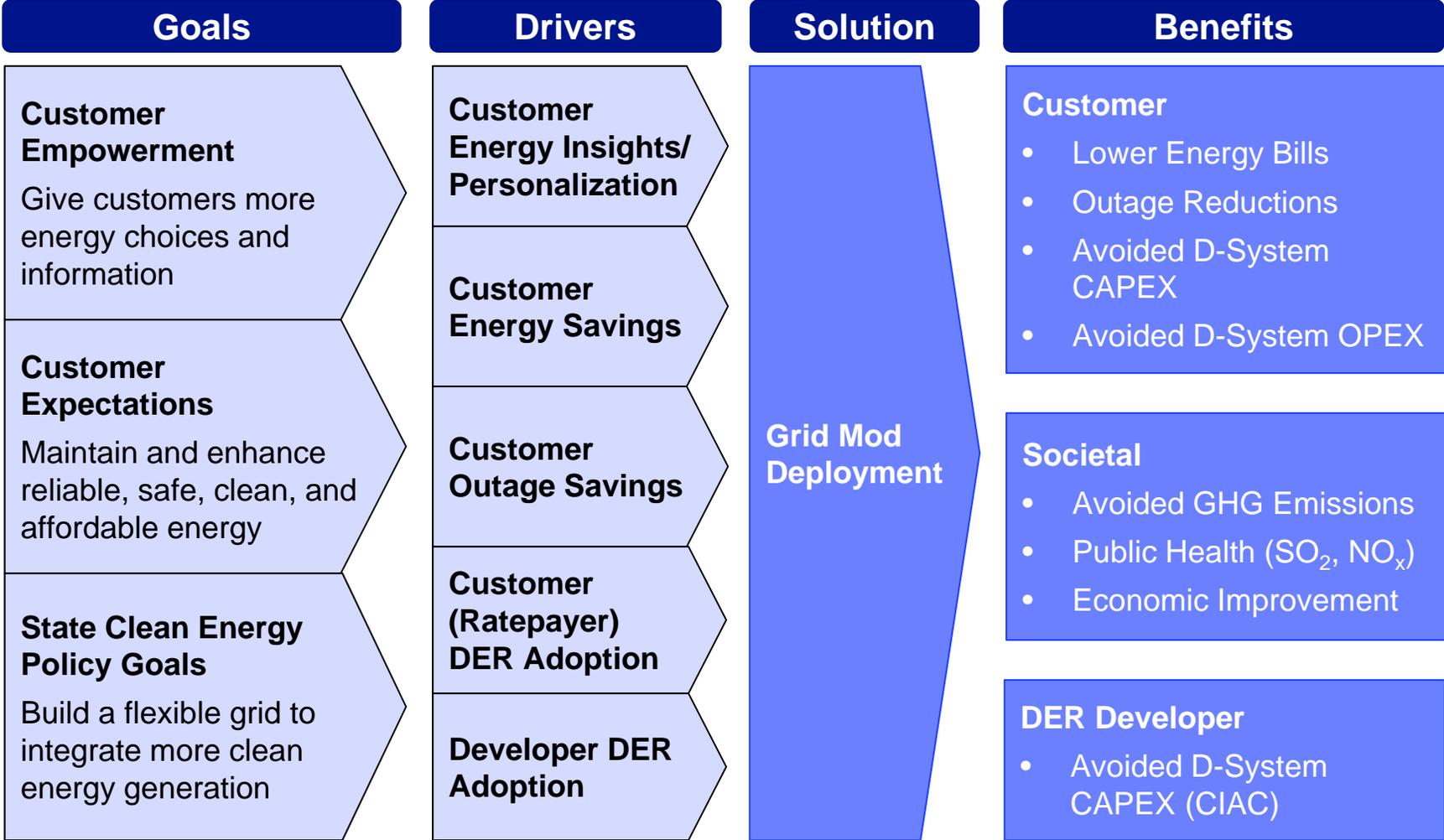
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Note: The final GMP costs and benefits are still under internal review and could change before the GMP filing

Need: Customer Empowerment, Expectations and Clean Energy Goals

- **The need is now:**
 - Customer adoption of renewable DG, electric vehicles, and electric heat pumps (to a lesser extent) is increasing
 - Over 100 MW of renewable DG was interconnected in 2019 and that pace is expected to continue or increase over the next 2-3 years at least
 - Significant time delays and costs associated with DG interconnections have our stakeholders asking us to be more creative and show how we are progressing to deliver on state policies
- **Without grid modernization:**
 - Customers will not have important insights into their energy use or how to manage it
 - Customer energy savings and outage reductions for all Rhode Islanders will not be possible in the next 10-20 years
 - Distribution issues caused by DER adoption will be ubiquitous in 5-10 years
 - The distribution system will be a roadblock to customer empowerment and achieving clean energy goals
 - The Company and State will be ill-prepared for the clean energy transition

Customer energy insights, energy savings and DER adoption are driving the need for grid modernization



Value: GMP BCA

The final GMP BCA includes updated forecast, cost, and benefit estimates

- **Benefits Updates:**

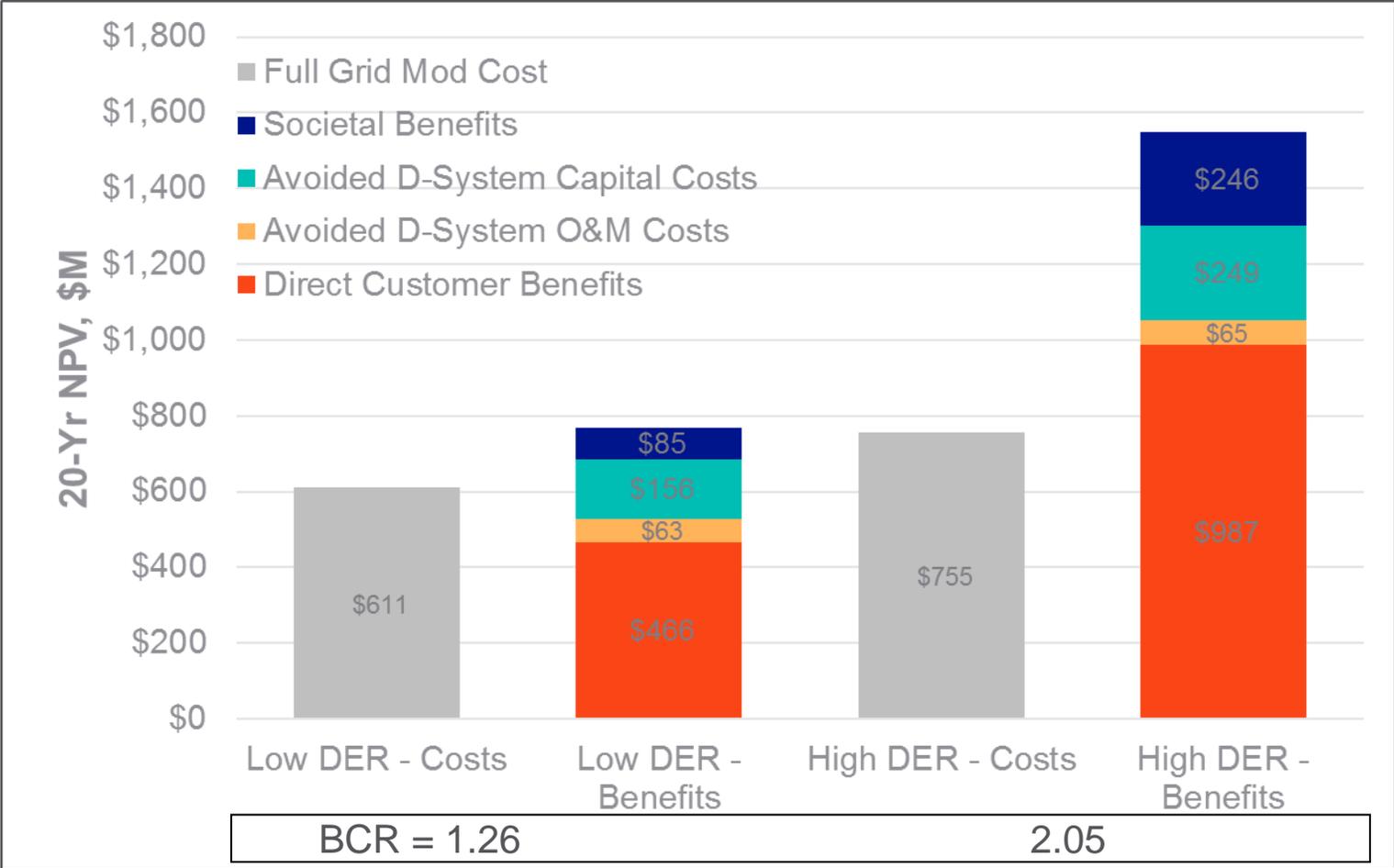
- Same benefit metric updates as presented in the AMF section (e.g., ISO NE emissions rates, “with EE” values)
- Refined Avoided Customer Outage Cost (FLISR) benefit assumptions
- Refined Customer Energy Savings (VVO/CVR) benefit based on feeder information and deployment assumptions
- Refined Load Optimization and Operational Efficiency benefits

- **Cost Updates:**

- Updated Low DER scenario to reflect the most recent Company forecast (also impacted benefits)
- Refined Underlying IT Infrastructure, Telecommunications, and Cybersecurity investment estimates based on the latest information
- Refined Advanced Field Device costs and deployment assumptions

Value: GMP BCA

GMP BCA Results with Updated Costs and Benefits (RI Only/Opt-Out)



Note: The final GMP costs and benefits are still under internal review and could change before the GMP filing

Accountability: Signposts and Metrics will allow us to deploy timely and effective solutions and realize benefits

- **Signposts: indicators that will be monitored so the GMP can adapt appropriately to the evolving environment**
 - DER Interconnections (installed and in-queue)
 - Dispatchable DER (available kW and kWh registered and number of dispatch events)
- **Metrics: indicators that will be monitored to ensure successful deployment and realization of benefits**
 - Implementation Metrics: assess deployment progress of GMP projects and initiatives to ensure grid modernization solutions are deployed according to plan
 - Performance Metrics: monitor the grid modernization solutions performance to determine if expected benefits are being realized

04

Appendix

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High DER Scenario requires modernization of 36 feeders/year (9 subs/year) to reach ~100% of distribution feeders by 2030 (FY31)

Grid Mod Deployment by FY	Low DER Scenario			High DER Scenario		
	Incremental Feeders	Cumulative Feeders	% Total	Incremental Feeders	Cumulative Feeders	% Total
22	8	42	11%	8	42	11%
23	20	62	17%	36	78	21%
24	20	82	22%	36	114	31%
25	20	102	28%	36	150	41%
26	20	122	33%	36	186	51%
27	20	142	39%	36	222	60%
28	20	162	44%	36	258	70%
29	20	182	49%	36	294	80%
30	20	202	55%	36	330	90%
31	20	222	60%	36	366	99%
Total	192			336		

Note: Feeder count excludes most Sub-Transmission feeders

Rhode Island AMF Overview

Public Utilities Commission Technical Session

September 24, 2020

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Agenda

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|-----------|-----------------------------------|
| 01 | Updates to Filing Date |
| 02 | Status of Filings in Other States |
| 03 | AMF Business Case General Preview |
| 04 | Appendix |
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Updates to Filing Date

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RI Collaboration Schedule



October 2020

Filing Date

PST Advisory AMF & GMP Subcommittee Meeting Schedule

Stakeholder Collaboration (i.e., Subcommittee meetings and discussions)

PST Workshops with RI PUC – April 9, 2019, November 5, 2019, and September 24, 2020

Obtain Feedback and Seek Alignment on Proposals and Approaches*

Review Initial, Refined and Final Proposals

Nov 27, 2018	Jan 31, 2019	Mar 28, 2019	Jul 22, 2019	Mar 31, 2020
<ul style="list-style-type: none"> Re-casted Schedule GMP: Current State and Future Scenarios AMF: Original BCA Overview AMF: Meter Taxonomy/Scenarios PST Storage Update 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting GMP: Grid Modernization Options AMF: TVP Rate Design AMF: Follow-up on Customer Engagement 	<ul style="list-style-type: none"> AMF: Initial Proposal and Updated BCA GMP: BCA Methodology GMP: Initial Implementation Plan and Roadmaps 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting Refined Proposal and Updated BCA (AMF & GMP) GMP: Refined Roadmap 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting Summary of feedback received Final feedback on proposal
Dec 13, 2018	Feb 14, 2019	Apr 18, 2019	Nov 1, 2019	Sept 15, 2020
<ul style="list-style-type: none"> GMP: Impacts / Opportunities AMF: Customer Value Streams AMF: Customer Data Access, Privacy, Governance, & Sharing 	<ul style="list-style-type: none"> Docket 4600 Alignment for AMF and GMP AMF: BCA Benefit Categories 	<ul style="list-style-type: none"> AMF: BCA Deep Dive session 	<ul style="list-style-type: none"> Agenda for 11/4 RI PUC workshop Summary of collaboration to date Remaining filing schedule 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting JDx Updates Summary of Changes and Final BCA Results
Jan 10, 2019	Feb 27, 2019	Apr 25, 2019	Dec 17, 2019	<p>(*) - Additional Stakeholder meetings occurred on 9/21/18 (AMF Collaborative Plan w/ DPUC and OER); 10/11/18 (Alternative Business Models w/ DPUC and OER); 10/26/18 (AMF Collaborative Kick-Off w/ Subcommittee); and 11/16/18 (Pilot Learnings w/ Subcommittee)</p>
<ul style="list-style-type: none"> GMP: Functionalities / Technologies GMP: BCA Overview / Issues AMF: Customer Engagement Overview AMF: Follow-up on Customer Data Access, Privacy, Governance, & Sharing 	<ul style="list-style-type: none"> GMP: Proposed Solution Set AMF: BCA Cost Categories GMP & AMF: Alignment with ASA Requirements 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting Refined Proposal and Updated BCA (AMF & GMP) GMP: Refined Roadmap 	<ul style="list-style-type: none"> PST Advisory Quarterly Meeting Summary of meetings and feedback received AMF: Rev Rqmts, Bill Impacts and Cost Allocation/Recovery 	

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	Initial Scheduled Meetings (to meet original 2/1 filing date)	AMF – Advanced Metering Functionality
	Additional PST Advisory Subcommittee Meeting	GMP – Grid Modernization Plan
		TVP – Time-Varying Pricing
		BCA – Benefit-Cost Analysis

AMF Filing Date

- Anticipated filing in May 2020, but delayed due to COVID-19.
- Currently plan to file the Updated AMF Business Case and Grid Modernization Plan in October.
- During this time, the Company has further refined the proposal:
 - Clarifying need, value, and accountability;
 - Incorporating updated forecasts and estimates;
 - Engaging with stakeholders to provide updates, and gather feedback;
 - Continuing business readiness activities; and
 - Monitoring activity in the affiliate jurisdictions.

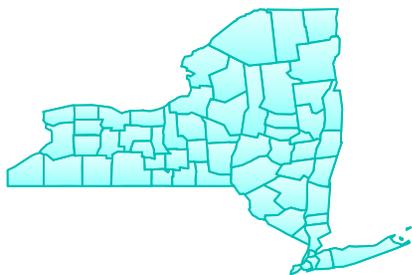
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Status of Filings in Other States

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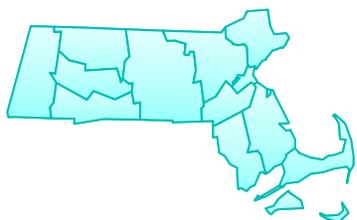


Regulatory Activity and Filing Timeline



New York

- Proposed full deployment of AMI electric meters and gas modules over 6 years.
- Total cost: \$654M (opt-out scenario 20-year NPV); \$635M (opt-in 20-year NPV).
- Awaiting Commission order, followed by a six-month ramp up ahead of project kick-off (Assumed April 2021 project start for recent rate case filing).



Massachusetts

- Department of Public Utilities opened investigation into targeted deployment of AMI meters and time-varying rates for electric vehicle customers in July 2020.
- Company filed initial comments in August 2020 and reply comments in September, highlighting operational need to replace metering fleet.
- Awaiting guidance on next steps.



Rhode Island

- September 15 PST Subcommittee meeting.
- September 24 PUC Technical Session.
- October 2020 file Updated AMF Business Case and GMP.

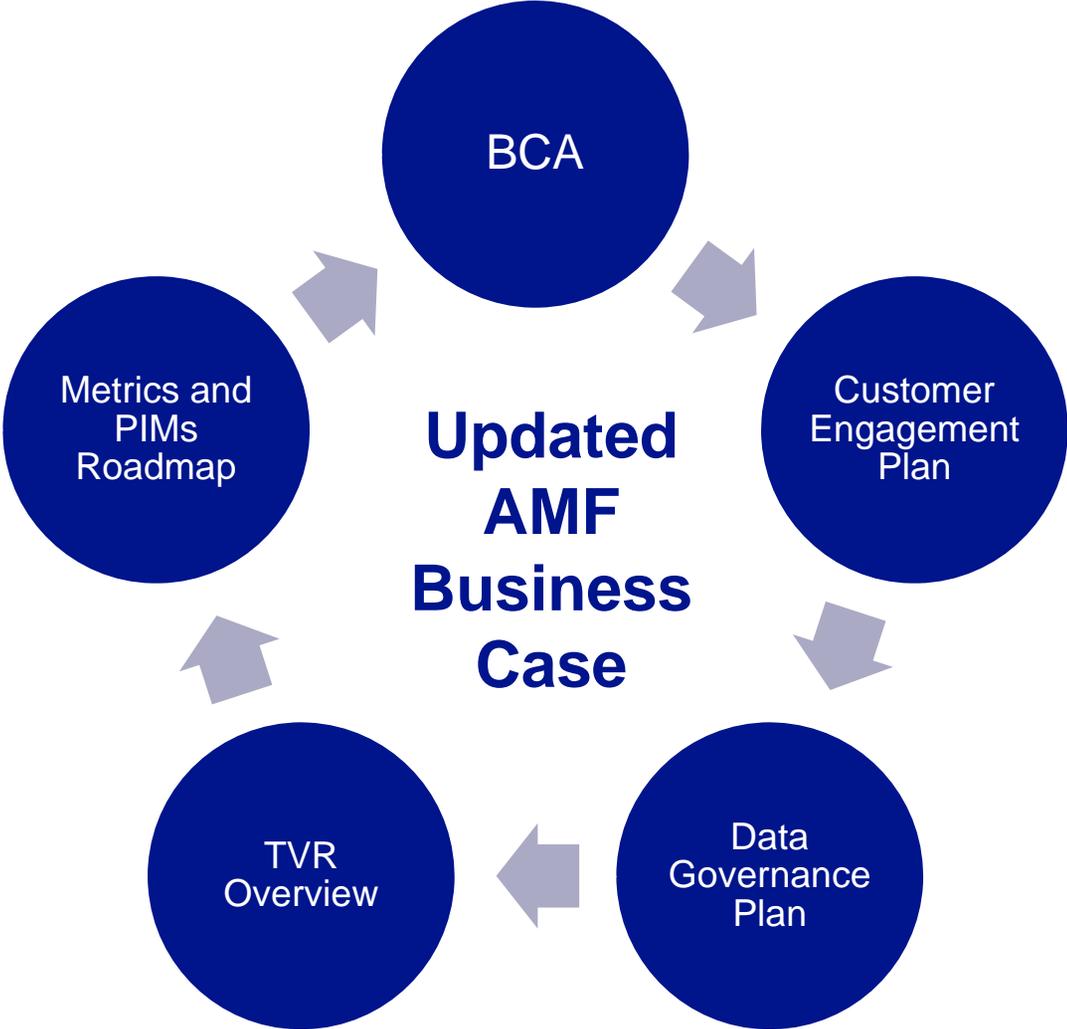
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AMF Business Case General Preview

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AMF Filing Overview



AMF Business Case

National Grid's vision is to be at the heart of a clean, fair, and affordable energy future. AMF is foundational to achieving that vision.

Need:

- **Customer:** Superior customer experience; energy savings; outage notifications.
- **Operational:** Approximately 2/3 of the AMR meters are at the end of their design life.
- **Clean Energy:** Resilient Rhode Island Act, net-zero carbon, 100 by 30.
- **System:** Increased visibility, granular system data.
- **National Trend:** Estimated 107 million AMI meters installed by end of 2020

Value:

- BCA developed and refined consistent with the Docket 4600 Framework.
- RI-only net benefits: \$128 million (opt-in) to \$238 million (opt-out).
- RI-only BCA Ratios: 1.43 (opt-in) and 1.79 (opt-out).

Accountability:

- Semi-annual reporting of AMF metrics.
- Upfront adjustment to the revenue requirement.
- Future collaboration on AMF-related performance incentive metrics (PIMs).

Need: AMR Replacement

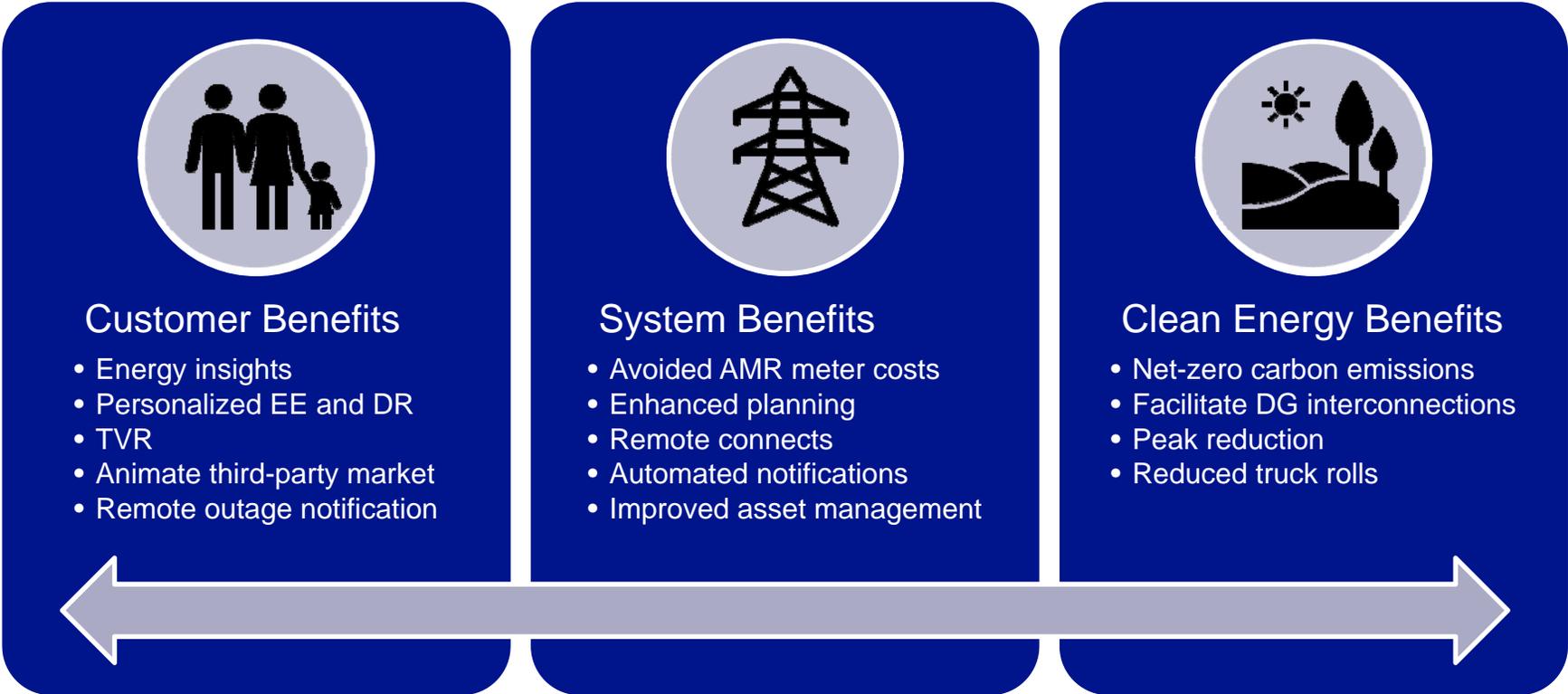
AMR counterfactual cost estimates: more than half of the long-term bill impact is unavoidable.

- The Business Case includes an estimate of counterfactual impacts based on avoided costs from the AMF BCA model.
 - The simple estimation does not capture cost to operate TVR on AMR technology or equipment costs associated with loads that are higher and peakier without AMF.
- On average, less than half of AMF impact on revenue requirement is avoidable.
 - Early-year impact from back-office activity is unique to AMF, but large costs during meter install years are partially inevitable.
 - Bill impacts in the Business Case are given relative to current levels – this does not reflect the fact that investment in AMF obviates the need for other investments (e.g., AMR).

	Year 1	Year 2	Year 3	Year 4	Year 5	20-year NPV	20-year Nominal
AMF cost less Type I benefits (\$M)	9	24	54	74	30	194	271
Counterfactual AMR cost (\$M)*	1	5	19	35	19	100	161
AMR percent of AMF cost	16%	19%	36%	47%	65%	52%	59%

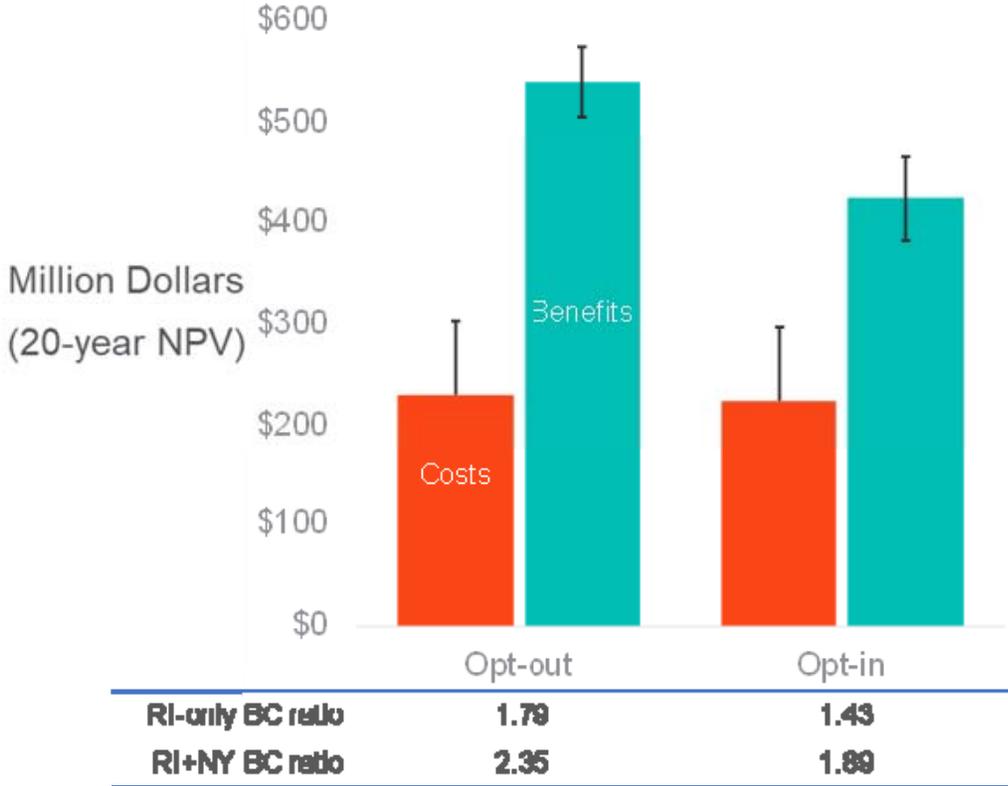
* Includes feeder monitoring sensors, AMR meters, AMR installation labor, and AMR-related CMS

Value: AMF Benefits



Value: AMF BCA

Final AMF BCA Results with Updated Costs and Benefits

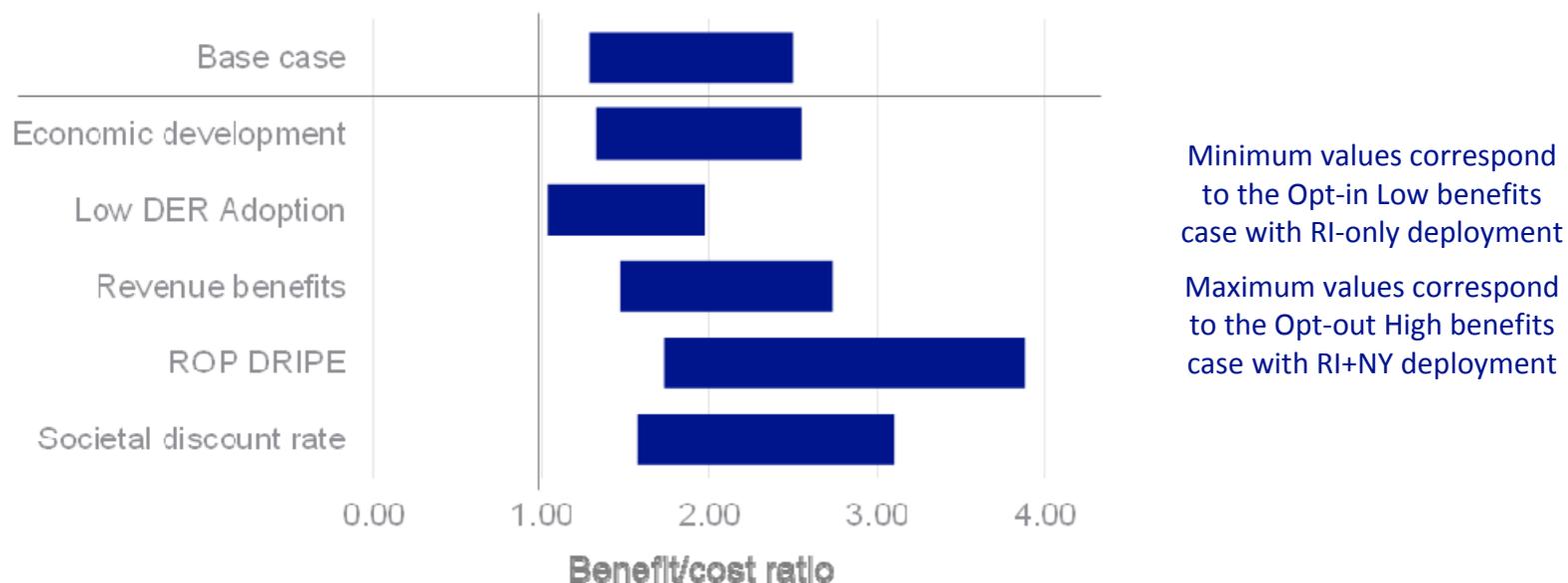


Upper bound of costs defined by RI-only deployment case (bar corresponds to RI+NY deployment)

Upper and lower bounds of benefits defined by high and low customer response cases (bar corresponds to midpoint)

BCA Sensitivities:

The lower bounds of all sensitivities have BCA ratios above 1.0



Sensitivities Analyzed:

- **Economic development:** adds benefits for the expected economic impact to RI from increased jobs due to AMF.
- **Low DER adoption:** assumes business-as-usual PV and EV adoption (inconsistent with the State's goals).
- **Revenue benefits:** characterizes transfers between customers from decreased bad debt write-offs, reduced theft, and improved meter accuracy as benefits.
- **Rest-of-Pool (ROP) DRIPE:** includes ROP DRIPE impacts (outside of RI) in addition to intrastate impacts.
- **Societal discount rate:** uses a 3% discount rate to calculate NPV instead of the utility WACC.

Accountability: Metrics, Benefits Guarantee, and PIMs

Metrics Reporting

- Cost Efficiency and Program Implementation
- Customer Focused
- Operations
- Third-Party Engagement

Benefits Guarantee

- Upfront adjustment to revenue requirement accounting for 80% of delivered non-Outage Management System avoided costs.
- Ensures customers receive the benefits earlier than they normally would (*i.e.*, the next multi-year rate plan).
- Incentivizes the Company to deliver (and achieve greater) benefits.

PIMs

- Collaborative process to develop PIMs in support of outcomes.

Customer Engagement Phases

Customer Engagement Plan Summary

Objective & Approach

Inform & educate National Grid customers on the benefits of smart meters to generate customer interest, increase customer acceptance of AMF and drive customer engagement, using a Listen, Test, Learn methodology.

Timeline

Network Deployment Begins Meter Installation Begins Meter Installations End

Phase I: Awareness



Build awareness of smart meter benefits, generate customer interest, address customer concerns

- Community meetings
- Table top demonstrations
- News/ Interviews
- Direct mail
- Email
- Social Media

Phase II: Deployment



Utilize 90-60-30 Day Communications Plan to guide customers through deployment process, including timelines, what to expect, & alternate choices

- 90 days before: key stakeholder community engagement
- 60 days before: customer awareness (mail, email, radio, print)
- 30 days before: direct customer outreach (mail, email, calls)

Phase III: Empowerment & Enablement



Help customers access, interpret & manage energy usage data, maximize TVR benefits, & connect them to third party vendors

- Educate customers on Customer Energy Management Platform
- Enroll customers in high usage alerts
- Connect to third parties through Green Button Connect

Insights to Leverage

AMF pilots (Clifton Park, Worcester)
Targeted RI customer surveys
Customer segmentation
Peer utility customer engagement plans
Industry consumer research & reports

Channels

Website	Direct Mail / Bill Inserts
Social Media	Media Relations
Online Ads	Contact Centers
Print Ads	Energy Innovation Hub
Email	Local Community Meetings

Opt Out Choices

Phase I	Meters
Phase II	Meters
Phase III	Meters & New Rate Plans

Customer Outreach and Education (through all phases)

Data Governance

“A Data Governance Plan regarding timely customer, NPP, and third-party access to system and customer data, (e.g., elements may include, but are not limited to, customer assigned peak load contribution, energy and capacity loss factors, interval usage, or other information needed for efficient wholesale and retail market participation) in place and billing quality customer data (e.g., elements may include, but are not limited to, electric usage in kilowatt-hours containing both “register reads” and “interval reads”) with the proper privacy and security protections;”

- **The Data Governance Plan meets the Amended Settlement Agreement objectives by:**
- Describing data access channels for customer and third-party access to customer data, as well as the availability of system data on the Company’s System Data Portal.
- Outlining a new energy data use case framework for analyzing, testing, and creating new use cases that can generate value for customers and the distribution system.
- Identifying the relevant data privacy and security considerations to protect the customer and system data collected.

TVR in the AMF Filing

AMF enables dynamic TVR rate structures.

More accurate pricing, more efficient energy sector, AND more equitable allocation of costs.

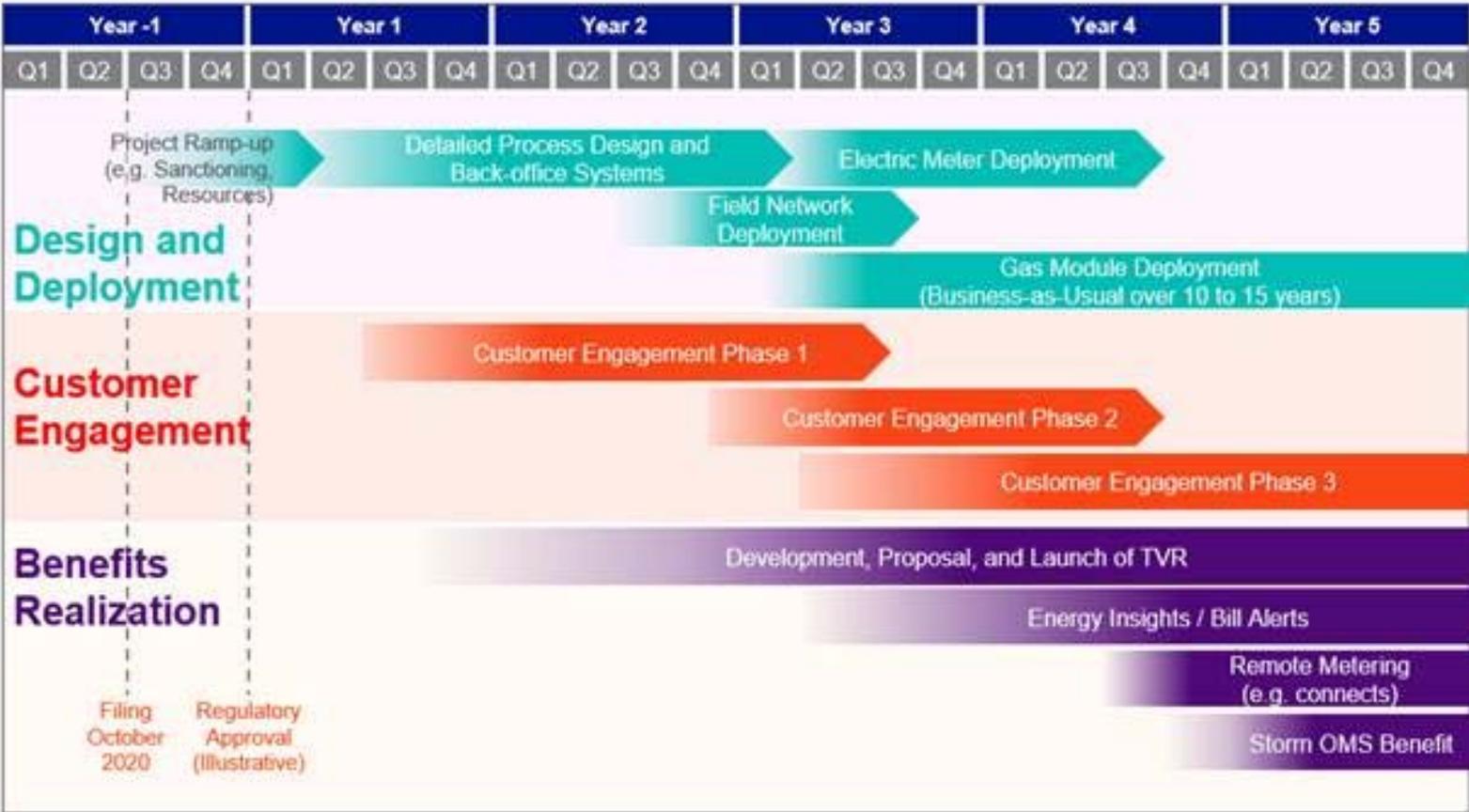
The Company is NOT making a TVR proposal in this filing.

- Commitment to making a TVR filing in its next rate case/suitable proceeding.
- Believes the rate modeled in the AMF BCA should be a benchmark for any alternative proposal.

TVR Modeled in the BCA (Supply-Only):

- Time-of-Use (TOU) captures variation in energy prices.
- Critical Peak Pricing (CPP) collects capacity costs.
 - Day ahead calls.
 - 70 hours of events of 4-6 hours in length.

Implementation Timelines



- October 2020: File Updated AMF Business Case.
- April 2021: Illustrative approval used to develop revenue requirement.
- October 2021: Illustrative project start following managed ramp up (24 months back-office systems).
- October 2023: Meter deployment would begin (18 months).

04

Appendix

nationalgrid



Acronyms

- ADMS = Advanced Distribution Management System
- AMF = Advanced Meter Functionality
- AMI = Advanced Meter Infrastructure
- AMR = Automatic Meter Reading
- ASA = Amended Settlement Agreement
- ASHP = Air Source Heat Pump
- BAU = Business as Usual
- BCA = Benefit Cost Analysis
- C&I = Commercial and Industrial
- CEMP = Customer Energy Management Platform
- CEP = Customer Engagement Plan
- CGR = Connected Grid Router
- CO2 = Carbon Dioxide
- CPP = Critical Peak Pricing
- D = Distribution
- DCFC = Direct Current Fast Charging
- DER = Distributed Energy Resource
- DERMS = Distributed Energy Resource Management System
- DG = Distributed Generation
- DLM = Dynamic Load Management
- DPAM = Distribution Planning & Asset Management
- DPL = Dayton Power and Light
- DR = Demand Response
- DRIPE = Demand Reduction Induced Price Effect
- DSCADA = Distributed Supervisory Control and Data Acquisition
- EC4 = Executive Climate Change Coordinating Council
- EE = Energy Efficiency
- EDI = Electronic Data Interchange
- EHP = Electric Heat Pump
- EIA = Energy Information Administration
- EPO = Energy Profiler Online
- ESB = Enterprise Service Bus
- EV = Electric Vehicle
- FAN = Field Area Network
- FLISR = Fault Location Isolation and Service Restoration
- GBC = Green Button Connect
- GBD = Green Button Download my data
- GHG = Greenhouse Gas
- GIS = Geographical Information Systems
- GMP = Grid Modernization Plan
- HAN = Home Area Network
- HCA = Hosting Capacity Analysis
- HVAC = Heating, Ventilation, and Air Conditioning
- ICAP = Installed Capacity
- ICE = Interruption Cost Estimate
- IoT = Internet of Things
- ISA = Interconnection Service Agreement
- IT = Information Technology
- LDV = Light Duty Vehicle
- LVA = Locational Value Analysis
- MA = Massachusetts
- MDM = Meter Data Management
- MV/LV = Medium Voltage/Low Voltage
- NMPC = Niagara Mohawk Power Corporation
- NPP = Non-Regulated Power Producer
- NY = New York
- NWA = Non-Wires Alternative
- OMS = Outage Management Systems
- PBR = Performance-Based Regulation
- PI Historian = Plant Information Historian
- PIM = Performance Incentive Mechanism
- PLC = Power-Line Communication
- PSE&G = Public Service Electric & Gas
- PSR = Platform Service Revenue
- PST = Power Sector Transformation
- PUC = Public Utilities Commission
- PV = Photovoltaic
- REC = Renewable Energy Credit
- REV = Reforming the Energy Vision
- RF = Radio Frequencies
- RGGI = Regional Greenhouse Gas Initiative
- RI = Rhode Island
- RMD = Residential Methane Detector
- RTP = Real Time Pricing
- RTU = Remote Terminal Unit
- SaaS = Software as a System
- SCT = Societal Cost Test
- SME = Subject Matter Expert
- ToC = Table of Contents
- TOU = Time Of Use
- TVR = Time Varying Rate
- VDER = Value of Distributed Energy Resources
- VMT = Vehicle Miles Traveled
- VPP = Variable Peak Pricing
- VVO/CVR = Volt-Var Optimization/Conservation Voltage Reduction
- WACC = Weighted Average Cost of Capital

PST Advisory Group composition by organization

Organizations
National Grid (NGRID)
Energy and Environmental Economics (E3) – Supporting NGRID*
Division of Public Utilities and Carriers (DPUC)
Regulatory Assistance Project (RAP) – Supporting DPUC
Synapse – Supporting DPUC
Office of Energy Resources (OER)
Northeast Clean Energy Council (NECEC)
Center for Justice for the Wiley Center
Conservation Law Foundation (CLF)
Acadia Center
Green Energy Consumers Alliance
Vote Solar
The Energy Council of Rhode Island (TEC RI)
Direct Energy (Retail Electric Suppliers Association)
City of Providence
Washington County Regional Planning Commission

* To provide additional expertise and a national knowledge base, the Company has contracted with Energy and Environmental Economics, Inc. (E3) to assist with the stakeholder engagement process and AMF/GMP filings